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Assessment of Science and Technology Education: Applications of DoD Modeling and Simulation Resources

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13. ABSTRACT (*Maximum 200 words*)
This report summarized the contractor's support of efforts to transfer technology developed for DoD uses to the educational environment. The bulk of the report describes activities chronologically. Specific attention is given to the computer aided education technology initiative (CAETI), support to the Office of Science and Technology Policy (OSTP), and demonstration of educational technology.

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1. Introduction

The Department of Defense has placed renewed emphasis on the transfer of DoD technology to the non-DoD and private sectors. The public policy concerns addressed by this new emphasis on DoD scientific and technical efforts goes to the strong commitment of the Administration to leverage DoD resources to enhance the global competitiveness of the U.S. economy. The Department of Defense has also recognized the increased need to make best use of available commercial or non-DoD developed technologies where doing so can permit DoD to meet operational requirements at lower cost and more rapid develop test, and evaluate a unique DoD solution. The Director, Defense Research and Engineering (DDR&E) is responsible for coordination of all research on, training, and test and evaluation policies. The Science Advisor to the President of the United States, Office of Science and Technology Policy (OSTP) requested DDR&E support to development a national education and training strategy through the use and integration of defense advanced information technologies. The Defense Modeling and Simulation Office (DMSO) has been identified as the DoD focal point for these information technology activities. Acting as the DDR&E's executive agent, the DMSO has been directed to foster cooperation between DoD and OSTP to maximize the integration of defense developed information technologies used to create computer-aided education and training environments while reducing unnecessary duplicative development and acquisitions of information products and capabilities. In addition, the DMSO will coordinate actions within and across DoD to ensure compatibility and complementary information technology activities support the stated objectives and policies.

DMSO has specifically requested that IRIA expand upon its previous task and join an ongoing DMSO effort to provide support to OSTP as part of IRIA's broad mission to facilitate use of existing scientific and technical information in support of DoD and national needs.

This report summarizes our efforts at evaluating DoD and related organizational modeling and simulation capabilities, technologies, and resources for potential application to national requirements. We were specifically tasked to:

- review and assess plans prepared by other DoD and Federal Government agencies and departments at the specific direction of the Office of Science and Technology Policy to determine whether or not DoD modeling and simulation capabilities can be effectively applied in addition to or in lieu of resources identified in such plans
- contribute technical advice on collection, analysis, and dissemination of modeling and simulation technologies in meetings, seminars, conference, workshops, and reports prepared at the direction of or by the request of the Office of Science and Technology Policy.
- focus on such scientific and technical topics including but not necessarily limited to the following

- infusion of modeling and simulation in education and training technology development
- insertion of modeling and simulation in on-going education and training programs
- application of DoD models and simulations in high-priority education and training areas identified by the Interagency Governmental Task Force (IGTF) for education and training technologies

In the following sections, our activities are first described chronologically in terms of

1. information collected and processed
2. information disseminated.

Following the chronological sections, we review specific areas in special sections.

2. Information Collected and Processed

2.1. September 1994

a. Participated with the Special Assistant for Education and Training (SAET) in the monthly meeting held for the Deputy for Technology in the Office of Science and Technology Policy (OSTP).

b. Participated in a meeting between the SAET and representatives for the Learning Foundation.

c. Gathered regulatory data, formats, and provided technical analysis and support for a draft Broad Agency Announcement being prepared by Dr. Kirstie Bellman, ARPA program manager for the Computer Aided Education and Training Initiative(CAETI).

d. Attended meeting with the technical support group for Dr. Bellman on the CAETI and provided technical assistance on the elements of the initiative.

e. Attended and provided technical support to the SAET for the meeting of the Interagency Subcommittee on R&D for education and training.

f. Represented the SAET at the meeting of the Federal interagency Excellence in Science, Mathematics, and Engineering Subcommittee.

h. Represented the SAET at the meeting of the principals of the Committee for Education and Training.

k. Attended and provided meeting support to the SAET for a workshop to develop a White House Technology Learning Challenge.

2.2. October 1994

a. Attended and provided technical support to the SAET for the meetings of the interagency Subcommittee on R&D for education and training, the Committee on Education and Training, and the Subcommittee for Science, Mathematics, Engineering, and Technology Education. These are recurring meetings on a monthly and quarterly basis that bring together the specific interagency communities to develop recommendations and guidance on the federal R&D agenda for education and training. Recurring efforts include support for on-going activities that center on the development of a strategic plan for federal expenditures in this area, the creation and staffing of an independent interagency technology office to provide federal management and oversight, and the development of program plans to be funded under the administration's centerpiece for education and training, the Technology Learning Challenge initiative.

b. Reviewed several federal and commercial documents related to technology for education and training. Included among these were 1):"Education in the Communication Age" by David D. Thornburg, Ph.D., and 2): "Computers in American Schools--1992: An Overview," a national report from the International Association for the Evaluation of Educational Achievement.

c. Represented the SAET at the meeting of the principals of the Committee for Education and Training. The meeting was to coordinate the continued development of the strategic plan and budget for both the R&D subcommittee as well as the Science and Math subcommittee.

d. Attended with the SAET a workshop on the development of white papers for the support of education and training in the Advanced Technology Program (ATP) of the National Institute for Standards and Technology (NIST). The ATP program provides large amounts of "venture capital" for business and industry to share research and development projects to stimulate software development projects that would be too high risk for industry to take on alone. Federal funding is used to build a business base while serving a technology R&D need that is beneficial to the federal government. The workshop resulted in a very favorable indication that the education and training technology segment would be included in the ATP program.

e. A major support effort was made this reporting period for the SAET by developing the necessary documents, conducting planning meetings, collecting data, and providing information to the departments and agencies for the FY96 federal education and training R&D budget priorities and the supporting strategic plan. Both of these efforts required the construction of briefings for convincing arguments to the OMB, NSTC, and other federal agencies. In conjunction, the related effort in the Technology Learning Challenge, a major initiative of this administration, continued to be worked with the goal of a complete program package available in early December.

d. Provided support to the SAET for the White House Technology Learning Challenge. The Technology Learning Challenge program will be an administration centerpiece for education and training that includes a grants program allowing schools, businesses, and communities to merge together to petition for funding in the form of grants for the development of compelling software or "content" for education, training and community applications. The White House task force is building a plan with agency responsibilities and funding implications to provide these challenge grants using technology in life long learning, digitizing federal holdings, using Internet, expanding the use of technology in existing federal programs and federal training, and a plan to provide outreach to the private sector.

2.3. November 1994

a. Attended and provided support for the monthly R&D Subcommittee meeting. Support included the draft strategic plan for the subcommittee and the proposed budget submissions for the FY96 intergovernmental R&D agenda for education and training. Other support to include agendas, briefing presentations, minutes, and normal meeting requirements were supported.

b. Met with Dr. Ruth David, Sandia Labs, and the SAET to discuss potential activities that the Sandia Laboratories may take in supporting the broad federal R&D agenda for education and training.

2.4. December 1994

a. Supported the SAET for meetings with congressional staff members to discuss the future status of congressional support for education and training R&D initiatives. Specifically, SAET in conjunction with Suzanne Ramos, Office of the Vice President, met with Sarah Davis and Doris Dixon (House and Senate staffers) on separate occasions to discuss the Technology Learning Challenge. Both staffers indicated there is good bi-partisan support and the key is to make sure it is intergovernmental and still managed by the independently established Interagency Technology Office (administratively supported by the Department of Education).

b. A member of the team attended an information briefing from Congressman Mica, representative from Florida. The congressman is looking closely at how modeling and simulation activities can be centralized in his home state and district in Florida.

c. Attended the National Coordinating Council for Technology in Education and Training (NCC-TET) with the SAET. The NCC- TET, a congress of over 100 associations with an interest in education and training technology, had lobbyists from key associations laying out their view of what the new legislation agenda would be. They felt that many of the existing programs that were recently passed such as Title III of the ESEA, would be revisited in recission hearings. They also stated that many of the federal programs would be curtailed and the funding and responsibility passed down to the states for management i.e., get the federal government out of the details.

d. Attended the quarterly meeting of the Committee on Education and Training with the SAET. This interagency committee is chaired by Madeline Kunin, Deputy Secretary of Education. The committee has recently finished their strategic plan. This team developed the draft portion of the plan that lays out the interagency R&D agenda, priorities, and funding requirements for education and training technology. The plan now goes forward to the National Science and Technology Council for their consideration and prioritization with other national R&D programs.

e. Attended and provided support for the monthly R&D Subcommittee meeting. Support included the final review of the draft strategic plan for the subcommittee and activities in preparation for the Demonstration Workshop.

Other support to include agendas, briefing presentations, minutes, and normal meeting requirements was provided.

2.5. January 1995

a. Participated with the Special Assistant for Education and Training (SAET) in the monthly meeting held for the Deputy for Technology in the Office of Science and Technology Policy (OSTP), White House Executive Office of the President. The meeting was budget oriented and discussed aspects of the President's budget and the support from the S&T perspective. The impending speech from Dr. Gibbons on the S&T portion of the budget was the main topic for discussion.

b. Attended an update meeting with the SAET on the status of the federal government's efforts to determine policy for copyrighting intellectual property in the digital world. Mr. Mike Nash, a copyright lawyer and member of the R&D Subcommittee core group, provided us with the status of the on-going efforts of the NII subcommittee on intellectual property. This is a very thorny issue and while many questions have been raised, few answers have been provided. Mr. Nash provided the SAET with a draft copy of their recent white paper on the subject.

c. Attended with the SAET a tour of a local school in the Washington D.C. area that has successfully integrated technology throughout their curriculum. Ms. Geri Anderson, a former congressional staffer with Senator Kennedy, is now the school technologist for the Georgetown Day School, a K-8 private school, and hosted our tour of the school. The school uses computers and the Internet as a routine tool in the conduct of their classes and the students are very comfortable and use these tools as a normal tool for learning. It is a teacher requirement that they be computer literate in order to teach in the system. While they have no hard statistics on the improvement in learning, they do have many testimonials supporting it.

d. Organized and supported the SAET in the conduct of a meeting of the Education and Training R&D Subcommittee core group. The core group was asked to brief the status of each of their areas of responsibility and interest in the Technology Learning Challenge (TLC) initiative. Dr. Tom Carroll, DoED, was invited to provide the group an update on the Learning Challenge grant program and the status of the start-up of the Interagency Technology Office (now named Task Force--ITTF). Dr. Stuart Starr, MITRE, indicated that the overall TLC initiative has been captured in a series of white papers that his staff has assembled into a single document. This document will have an executive summary based on the comments prepared by Dr. Henry Kelly, OSTP, and will be given as a package to OSTP for their dissemination. Dr. Tom Carroll reported that the Challenge Grant supporting pamphlet and structure for dissemination and awards was being finalized for a February 18 deadline. The other members took Dr. Carroll to task for not bringing in more members to the ITTF from other federal agencies and for appearing to make this a Department of Education initiative only. He was also questioned on why he was not concentrating on the longer term implications of the office to accommodate future demonstrations and R&D activities and not just the Challenge Grant piece. Dr. Carroll reemphasized that his mission was only Challenge Grant at this time.

e. Team member traveled to Germany during the week of 16-20 January as a member of the CAETI team that surveyed selected DoDDS schools for quick start technology insertion programs. This quick start has been dubbed the POGO program. Activities in Germany included a detailed survey of infrastructure needs from local and wide area networks to specific computer hardware and software needs at the teacher workstation level. Management plans were also developed to ensure a strong relationship between CAETI and DoDDS needs. The POGO team spent a good deal of time with the DoDDS teachers at the selected schools (Hanau and Wurzburg) to inform them of the technology insertion project and what their role would be. Support to the POGO and succeeding CAETI BAA projects will grow as the program moves along. The OSTP interest and

support to these CAETI projects remain high since they have come to represent the Administration's flagship R&D technology demonstration for education and training.

f. Team member supported several coordination meetings for Dr. Bellman in relation to the CAETI program. Of note was a meeting with Dr. Rick Satava, ARPA, the Project Manager for telemedicine technology. His program is exploring several areas of common technology that would be useful in the education and training domain. An agreement was made to continue to stay in close coordination on areas of mutual interest.

g. Reviewed a software product from Lynne Gilfillan Associates (LGA) that is a tool to build the vision, goals, and objectives of a program and develop the linkages between road maps, milestones, funding and technology. The demonstration indicated this may be a great tool for CAETI management as well as other programs that need top-down structure.

2.6. February 1995

a. Participated with the Special Assistant for Education and Training (SAET) in the monthly meeting held for the Deputy for Technology in the Office of Science and Technology Policy (OSTP), White House Executive Office of the President. The meeting was exclusively concerned with the rescission actions and their potential outcomes in science and technology programs.

b. Mr. Chatelier and Dr. Bellman met with MG (sel) Ted Campbell, USAF, to discuss opportunities that exist to transition education tools into the modeling and simulation activities of the USAF. General Campbell is currently the Director of the Air Force version of the Defense Modeling and Simulation Office (DMSO) with pending assignment to the Director, Force Requirements for the Air Force. His interest and support in simulation and training will continue to dictate how the USAF views and plans their future force structure. The meeting was very positive and common ground was struck between the ARPA CAETI program objectives and the Air Force training and simulation needs. General Campbell desires to work with Dr. Bellman and the CAETI program to develop trade-off criteria that will help the Air Force make decisions regarding the use of various types of training technologies (table top, VR, full systems, use of AI, etc.). General Campbell stated that he is going ahead with some research programs to help the reserves with such decisions but would support and help fund anything that ARPA wanted to do in this area.

c. Mr. Chatelier and Dr. Bellman attended a site review and progress meeting at APPLE corporation to review a Technology Reinvestment Program (TRP) contract that focuses on authoring systems. It is called the East-West Consortium. This was a two-day meeting and clearly demonstrated that the consortium is making significant headway in advanced authoring techniques. They are basing some of their advances on "Quick Time VR" and how it can be used as a new media for lifelong learning. Members of the consortium are APPLE, Houghton Mifflin, and Stanford University. The consortium has sponsorship at both NSF and ARPA. Dr. Bellman is the PM for this program. Key themes they have as goals are the following:

(1) A more engaging capability for stimulating new interactions and new media.

(2) A more efficient means of animation.

(3) A more effective constructive capability that is more than just

(4) playing and making games.

(5) More viable authoring tools in general that are customizable to the

(6) focused environments.

d. Mr. Chatelier and Dr. Bellman attended management and technical reviews of current and future DoDDS school sites in Europe for the CAETI program. The trip was ten days at fifteen different locations in Germany and Italy. The subjects covered were the following:

(1) The attitude of DoDDS Europe regional leaders in relation to the planned program. Leadership was very supportive but concerned about future plans.

(2) Connectivity of the schools and infrastructure development particularly the question of who pays for what parts of the overall infrastructure.

(3) How the pilot schools are developing in terms of teacher and union acceptability. The CAETI program was described to the teacher attendees at the various sites and many of the concerns were addressed to the school's satisfaction.

(4) Two complexes in Italy were surveyed to determine their differences from the sites in Germany. It was determined that the schools visited in Italy had taken a lot of local initiative and wired the schools themselves for connectivity. The question was how well did they conform to the overall DoDDS network standards. The schools in Italy were extremely supportive of the project but had less to offer in meeting the criteria for designated CAETI program school sites.

(5) Visited the GIJON institute of training in Italy which is the Italian version of an FFRDC such as RAND or MITRE. They provide all the technical training and education to the Italian armed forces and the Italian ministry. A tour of the institute was conducted and we received their willingness to assist the Italian DoDDS schools if they are chosen to participate in the CAETI program.

e. Mr. Chatelier and Dr. Bellman coordinated with the training and simulation support activities for the Army and Navy in the Orlando, Florida. The purpose was to lay the groundwork and discuss mutual development activities for education and training tools being funded through the CAETI program and how these may be migrated with minimal support, to the needs of the services. Both the Army and Navy were very supportive of this approach and have agreed to make a concerted effort to look at common ground for use of these technology tools.

f. Attended a coordination and planning meeting with the SAET sponsored by David Lytel, OSTP, on the initiative to digitize federal government materials. Attendees were key representatives from the principle federal agencies that are the repositories of large federal holdings such as the Smithsonian Institute, Library of Congress, National Park

Service, and National Archives. This group is developing an initiative to encourage the private sector to take on the task of digitizing federal holdings so they may be available over the NII to the education and training community as well as the general population. The current thinking is to allow exclusive access to these materials for a set amount of time (two years possibly) if the companies agree to provide the digitized material to the federal government at the end of the specified time. Discussions with the private sector have begun on this approach.

g. Assisted the SAET and attended several meetings and demonstrations with companies, organizations, and individuals that were sharing their education and training technology ideas and products. Most of these visitors were seeking contact information, funding support, or a sounding board for the direction they were going. Included in these visits and demonstrations were: Sheldon Fisher and the use of CD-ROM in the classroom, the Alliance for Converging Technologies, Planning Research Corporation's idea of a production center for multimedia to support educational content over the NII, Mr. Robert Peterson's fielded software product that is an exceptional management tool for all phases of school administration, BBN status of their education activities within their corporation, and a briefing from Martin Marietta on their proposed initiatives in education and training technologies.

h. Attended with the SAET a meeting hosted by the National Coordinating Council on Technology in Education and Training (NCC-TET) to plan responses to the announced House Committee's rescission on programs involving educational technology funding. The briefings presented a gloomy future for funding in this area but NCC-TET members were encouraging their constituent members to launch a letter writing, telephone and personal contact campaign to their representatives to block these reductions.

i. Attended a demonstration at a small software company, LGA, of their product that manages and links an organization's strategic plan with road maps of all the various elements, the funding, the technology, timelines and responsibilities. This office is being trained on the use of this product that is free to government entities for potential use as a management tool for the CAETI program. Training is scheduled in April.

j. Participated with the SAET in the annual Science and Technology Conference hosted by the National Science Foundation. A number of valuable briefings, demonstrations, and presentations were made that indicated the breadth and depth of technology now being instituted in the education and training community; particularly in the area of science, mathematics, and engineering.

2.7. March 1995

a. Participated with the Special Assistant for Education and Training (SAET) in the monthly meeting held for the Deputy for Technology in the Office of Science and Technology Policy (OSTP), White House Executive Office of the President. The meeting was primarily concerned with the recently released report on the assessment of critical technologies.

b. With the SAET, attended the Department of Education's (DoED) national conference on technology. The DoED conference brought together representatives from all the states to provide information and assistance on how to prepare state technology plans and secure federal funds earmarked for that purpose. The technology planning grants are spelled out in the Elementary and Secondary Education Act and dissemination and preparation assistance is a part of the DoED's office of technology charter. The SAET coordinated with a number of state representatives to gauge their progress and technology needs within their schools.

c. The SAET met with a number of individuals prominent in education and training technology initiatives during the reporting period. The meetings included Mr. Ray Ramirez from the North Central education laboratory, Mr. Charles Beagle from the training department of the Veteran's Affairs office, and Mr. Russ Barnes from the Distance Learning Board. An exchange of views on what is required in national technology plans was discussed.

d. The support team and the SAET met with the ACE task force on distance learning to assist this group in the formulation of their technology vision and strategic plan for distance learning. The support team agreed to work with the ACE task force on the preparation of the strategic plan for the next meeting of the planning group. A productive benefit was the description of the many commercial training providers now seriously getting into the distance learning market. For example, the ICF training by correspondence firm has thousands of customers desiring training on information management topics and does over $150M annual business in this arena.

e. Assisted the SAET in preparation for a meeting with an OSTP led group to bring together those government agencies with extensive resources that could be digitized and provided to the American public via electronic means. The meeting brought together representatives from the Smithsonian Institute, Library of Congress, National Archives, US Park Service, Department of Defense, and other interested agencies to determine what processes may be instituted to encourage the private sector to digitize these materials and make them available over the Internet. The most popular proposal was to allow exclusive access and use to the materials by participating commercial companies for a limited amount of time (two years suggested). The stipulation was that after the agreed upon time limit, the "vanilla" copy of the digital data would be provided to the government for their use.

f. Attended the follow-on meeting of the National Coordinating Council on Technology for Education and Training (NCC-TET).

g. Assisted the SAET in preparing information and presenting material to congressional staff members Kilroy and Representative Kildee to influence the continued bi-partisan support to technology for education and training. The OSTP strategy was to enlist as much bi-partisan support to this area as possible. Other key staff members will be provided information in the following weeks.

h. In support of the CAETI Program Manager (PM), Dr. Kirstie Bellman, a number of meetings were organized and briefings conducted to build a cooperative service, joint,

and OSD customer base for the CAETI tools to be used for DoD training applications. Prominent among the organizations and activities in this approach are the USAF modeling, simulation, and training requirements office, the Air Force Reserves, the Army transportation school, Army STRICOM, Navy NAWC-TSD, Defense Acquisition University, and others. The thrust of the initiative is to use limited seed money from the CAETI program and leverage service money to modify CAETI tools for use in the DoD training arena thus providing benefits beyond the DoDDS schools applications.

i. Attended for the CAETI PM, a demonstration by the George Mason University Center for New Engineers on training modules developed for computer applications using the World Wide Web and networks. The demonstration clearly pointed out the capability to provide individualized or collaborative learning over networks in a distributed fashion.

j. Conducted a small group meeting of key CAETI support members to assist DoDDS in building an algorithm for selecting the schools to be used in the next phases of the CAETI technology insertion plan. A matrix was constructed that took into consideration school size, test results, socio-economic status, physical location, networks in place, and willing cooperation by the teachers and administration. The proposed list has been provided to the Director, DoDDS for her approval.

k. Conducted routine weekly meetings of the CAETI core management group that looks at the status of the CAETI program and contracts execution on a weekly basis. The most recent meeting included the government contract support office from the Naval Research and Development command (NRAD) who reviewed and recommended to the PM the most effective contracts system to use. Additionally, this team constructed a data base that tracks the status of the various ARPA orders (AOs). The AOs are the tools by which dollars are requested for the various providers and must be approved by ARPA before they go to the contracts office for execution. A daily status tracking system was critically needed for this phase of the CAETI program.

l. Attended for the CAETI PM a conference discussing the use of leading edge technology for use in the field of telemedicine. There are many similarities in the technologies applied to this domain and the education and training domain. A close working relationship between the CAETI and the Telemedicine PM at ARPA has been established.

m. Attended a one day training session on a software package named PLAN-iT. This software is an excellent tool to provide automatic linkages within a program between strategic goals and objectives, milestones, sub-elements, timelines, reports, and fund expenditures. The software is being reviewed for adoption and use in managing the CAETI overall program. It will be this team's responsibility to maintain it.

2.8. April 1995

a. Attended a meeting with the SAET hosted by the National Coordinating Council for Technology in Education and Training (NCC-TET) to review federal activities concerning the telecommunications bill. The NCC-TET works closely with OSTP to highlight common areas of interest in education and training technology and develop

mutually agreeable solutions on ways to best support the use of technology. This meeting reported on the status of the telecommunications bill and the importance of universal services for schools. the SAET provided a briefing to the group on the OSTP position.

b. Attended a briefing with the SAET hosted by NASA that laid out NASA's various educational programs for the nation's schools emphasizing the use of technology. The briefing was very informative and provided a spring board for the consideration of good programs that may be included as federal demonstration programs (with minor changes) and folded into the Interagency Technology Office's (ITO) general oversight.

c. Participated with the SAET in a demonstration hosted by the Greater City Schools Association at the Smithsonian Institute. The demonstration provided a vision of the 21st Century Classroom with live, on-line demonstrations among a number of schools across the nation collaborating in learning using computers over the Internet. The demonstration was particularly effective in showing the deployment of software tools in a real learning setting.

d. Attended a demonstration with the SAET during a trip to La Jolla, CA of three dimensional virtual reality tools being used in the workplace for biotechnology applications. With very little modifications these tools could be used in the classroom to teach basic and advanced science applications.

e. Assisted the SAET in organizing and conducting a meeting to follow up on an earlier meeting of the Committee for Education and Training. Issues raised at this meeting requiring further coordination included the organization and funding of the ITO. Of particular interest was the status of the funding earmarked by OMB from DoED funds for interagency technology demonstrations to be administered by the ITO.

f. Assisted the CAETI Program Manager in continuing the development of potential feedback of CAETI tools to the DoD training mission. Another series of meetings was held with DoD organizations that have a primary training and/or education mission within the department. The purpose of the meetings was to better understand the training and/or educational requirements of these organizations and see if their needs could be met or supplemented by the technology tools that are being developed under CAETI. The meetings included continuing or new coordination with a broad constituency across DoD to include the Defense Acquisition University, Air Force Reserves, National Guard (all services), Army Simulation, Training and Instrumentation Command (STRICOM), Army Training Support Center of TRADOC, Curriculum Development Center at Ft. Lee, Army Research Institute, Navy Air Warfare Center-Training Support Division, and others. The result of the meetings was an agreement to share in joint development efforts of the CAETI technology and with matching funds, provide these technologies to meet the varying needs of the DoD customers.

g. Represented the CAETI PM in a meeting with the DoDDS information management team, National Science Foundation representative, and the POGO integration representatives to better understand and coordinate the network and computer equipment needs of the CAETI project, NSF project, and the DoDDS school system. The major issue is whether to commit to purchasing DOS machines, Mac machines, or a

combination of the two. The decision was to look closely and investigate the new cards that Apple is advertising as a soon to be released product that will allow Mac machines to fully integrate DOS multimedia without the loss of any functions. The meeting also discussed plans and schedules for installing the school LANs and the most economical way to provide WAN connectivity to the Internet.

h. Assisted the CAETI PM in planning, organizing and conducting two separate weekly program management reviews. One deals with the core management team and includes an overview of the status and tracking of contract activities, resource status, and major program issues. The second is held with the POGO team members and addresses all the activities of the quick start part of the program to include status of products, school preparation, and transition to CAETI.

3. Information Disseminated

3.1. October 1994

a. Provided draft minutes for the SAET's review and submission to the Subcommittee on R&D meetings, Committee on Education and Training, and the White House Task Force on the Technology Learning Challenge. A special package was produced that provided the R&D Subcommittee Co-Chairs the material to hold one-on-one briefing to their counterparts on the need for and type of federal technology demonstrations.

b. Developed a briefing package for the SAET to use in a presentation to the Defense Acquisition University's annual conference on technology and learning, a short briefing for presentation as a panel member with the Ed Kiley group, a short presentation to the University of Central Florida Institute for Simulation and Training, and a briefing to OMB and the DoED on the proposed organization of the Interagency Technology Office.

c. Provided draft briefing packages and support for the Office of Management and Budget, Department of Education on the Intergovernmental Technology Office, Subcommittee on R&D, CET meeting, White House Task Force on the Technology Learning Challenge, and the Education, Training and Re-Employment work group meeting. Also provided draft white papers, briefings, and meeting minutes for the technology R&D budget summary, draft strategic plan, and demonstration framework.

d. Provided a draft briefing package with multimedia support to Dr. Kirstie Bellman, ARPA Program Manager, for Dr. Anita Jones, Deputy for Defense Research and Engineering. The package was in support of a briefing Dr. Jones gave to EDUCOM, a large conference of over 3000 prominent national educators. The package covered the training and education mission of DoD, the critical use of technology in this mission, and the potential of transferring this technology to the civilian sector. The briefing was a 35mm slide package supported by a video tape presentation. Additionally, the basic CAETI briefing package was updated to include key areas developed and used in Dr. Jones' brief.

e. Continued to work on a draft program management plan outline for Dr. Bellman that lays out a coordinated approach for the CAETI. Additionally, routine program management items were provided to Dr. Bellman via e-mail and hard copy to include an updated Rolodex, publication of a calendar of key events, and meeting summaries.

3.2. November 1994

a. A great deal of support activity was generated for the preparation of the R&D Subcommittee's technology demonstrations workshop. A number of planning meetings were sponsored to prepare for the workshop and a draft focus call document laying the recommended demonstrations, their criteria, and examples of each was produced for all workshop participants. The workshop will result in the details necessary to lay out a BAA-like call for technology demonstrations from the various federal agencies in FY96.

b. Several coordination meetings were held with Mr. Tom Carroll, the newly appointed head of the Interagency Technology Office (ITO). This office was authorized to be established by congressional language to supports the oversight and management of the Technology for Learning Challenge Grant program beginning in FY95. This office is preparing the details of the Challenge Grant program and how communities of learners (K-12 schools only in FY95) will be eligible to apply for grants to support projects using technology in learning. The SAET with this team's support, has the responsibility to help stand up the ITO and get it functioning in short order. It is anticipated the ITO will have announcements on the Challenge Grant program sometime in February, 1995.

c. Prepared slides and informational packages in support of the SAET's briefings to various organizations and agencies. Specifically, this included Smith, Bucklin Associates, SRA as sponsored by the EGC Corporation, the FAA magnet school's conference, and a distributed simulation demonstration by the Institute for Defense Analyses for the National Association of Secondary School Principals.

e. Prepared a formal multimedia presentation for Dr. Anita Jones, DDR&E, OSD, for her briefing on to the EDUCOM conference.

f. Reviewed the draft strategic plan for distance learning prepared by the Defense Acquisition University. Comments were provided on recommendations for improving and executing the plan.

g. Reviewed a number of professional reports, documents, and publications for their applicability to the overall technology for Education and Training initiative. Among those were the state of Maryland's educational technology plan, the Far West laboratory's guidelines for developing state technology plans, and the Office of Technology's report on virtual reality.

3.3. December 1994

a. Support was provided to the conduct of the Technology Demonstration Workshop held on 12 and 13 December at the MITRE Corporation. The workshop consisted of approximately 60 participants from across the federal agencies that are the principle stake holders in technology for education and training within those agencies. Many are the same core members from the R&D Subcommittee that have been working on this initiative for the past 18 months. The workshop was a great success and resulted in a document that lays out the focus call for projects across the communities and in the technology areas that have been stressed in the draft strategic plan. There were ten sub-groups that each took a major segment of the learning population (Early Childhood, K-12, School to Work, Post Secondary Education, Linking Home School and Community, Military Training, Incumbent Workers, Teacher Preparation, and Special Populations) and developed the framework for what is required to build demonstrations in these areas. Included in the focus call document are the project descriptions, essential and desirable criteria, desired outcomes, customers, and examples of possible programs. The focus call product will be provided to the Interagency Technology Office as their guidance document for funding proposals in these areas in FY1996 and beyond.

b. A secondary part of the workshop that required this team's support, was to reserve an afternoon of the second day to host a meeting of the group for Dr. Tom Carroll, Director of the new Interagency Technology Office. Dr. Carroll was interested in getting feedback and ideas on what the Challenge Grant should be and the workshop member's consideration for priorities. Dr. Carroll is using meetings such as this one to craft the Challenge Grant document that will soon be out for the virtual learning communities (discussed earlier. Once the Challenge Grant is published, learning communities can petition for grant money to put technology to work for the increased production of learning.

c. A significant amount of effort continues to be provided to Dr. Kirstie Bellman, in support of the CAETI. Support to this project is becoming more demanding now that the BAA has been released and concept papers are being received. Additionally, with the decision to coordinate with the NSF effort as a companion piece to CAETI, it is necessary to support aspects of that program as well (from a CAETI perspective).

d. Prepared the draft minutes for the quarterly Committee on Education and Training meeting and provided them to the Executive Secretary for dissemination.

e. Based on a Review of the draft strategic plan for distance learning prepared by the Defense Acquisition University, prepared an outline of potential technology applications to support the networked learning they are considering.

f. Reviewed a number of professional reports, documents, and publications for their applicability to the overall technology for Education and Training initiative. Principle documents were related to the draft strategic plan and the final review of the plan itself.

3.4. January 1995

a. A significant amount of effort continues to be provided to Dr. Kirstie Bellman, in support of the CAETI. Support to this project remains at a high level and will continue to be so as it moves from a proposal stage to project selection and implementation stage. Additionally, with the decision to coordinate with the NSF effort as a companion piece to CAETI, it is necessary to support aspects of that program as well (from a CAETI perspective).

b. Supported the SAET in several coordination and informational gathering meetings with prominent members of the education and technology community. Among the meetings for this reporting period were ones with Dr. John Yrchik, technology office, National Education Association, Ms. Brenda Kempster, Chairperson, National Coordinating Council for Technology in Education and Training, and two members from the RAND Corporation that are developing technology initiatives for that non-profit organization.

c. Supported the SAET in developing "informal" presentations to members of the congressional staff on the Administration's interagency research and development initiative. The meetings during this reporting period were with members from the staffs of Cochran, Bingaman, and Kerry. All meetings went well and the staffs profess to remain committed to educational technology as a bi-partisan effort. Again, however, the

SAET was cautioned that this should be an interagency effort and not one under the Department of Education exclusively.

d. The support team met with Dr. Lenor Sack, Defense Acquisition University (DAU), to discuss the interface between the R&D activities being pursued in the CAETI program and DAU. Dr. Sack is very interested, as is Dr. Kirstie Bellman, that the two agencies work together to develop synergistic use of the products being developed. This fits well into the overall CAETI program and provides a logical feedback of DoDDS tested technologies into the broader DoD program. Coordination will continue with DAU as the CAETI program moves along.

e. Worked with the POGO team (quick start for CAETI) to develop the post survey results based on the DoDDS school survey in Germany. Post survey results were formalized in a briefing that is scheduled to be given to Dr. Bellman in the next reporting period.

f. Supported the preparation of a CAETI overview briefing for Dr. Bellman for her use in briefing Dr. Lilian Ramirez, the Director, DoDDS. Dr. Bellman had a very successful first meeting with Dr. Ramirez. The outcome of the meeting was a caution to go slow on technology insertion projects with the DoDDS schools, make sure they are ready, do not overwhelm them, and ensure that the technology plan dovetails with the overall DoDDS strategic planning process. This information was disseminated to the POGO team.

g. Reviewed a number of professional reports, documents, and publications for their applicability to the overall technology for Education and Training initiative. Principle documents were related to the draft strategic plan and the final review of the plan itself.

3.5. February 1995

a. A significant amount of effort continues to be provided to Dr. Kirstie Bellman, in support of the CAETI. Support to this project remains at a high level and will continue to be so as it moves from a proposal stage to project selection and implementation stage. Additionally, with the decision to coordinate with the NSF effort as a companion piece to CAETI, it is necessary to support aspects of that program as well (from a CAETI perspective).

b. Assisted the SAET in preparation for a meeting he had with Dr. Sharon Robinson, Office of Education and Research Initiatives (OERI), Department of Education. The meeting was to discuss the possibility of earmarking available demonstration funds under OERI control to satisfy the intergovernmental initiatives developed earlier for education and training technology demonstration projects. Dr. Robinson is favorably disposed toward supporting an intergovernmental project and agreed to provide $5M in FY95 funding. These funds will be part of a later announcement of Technology Learning Challenge activities beyond the Challenge Grant activities recently announced.

c. On behalf of Dr. Bellman, we made a presentation to the Defense Acquisition University (DAU) discussing the types of technologies that may be useful to them as they begin to move into a distributed learning format. The long range plan is to collaborate with DAU for assistance in planning for distance and distributed learning and to use them

as a testbed for migrating CAETI tools from DoDDS educational applications to DoD education and training applications. DAU has requested a follow-on briefing of the CAETI program in detail.

d. Dr. Bellman and Mr. Chatelier met with Dr. Linda Roberts, Technology Advisor to the Department of Education, to discuss CAETI activities in relation to national technology goals. It was agreed that coordination would continue but that the CAETI program would continue as presently designed.

e. Assisted the SAET in an OSTP briefing on the Administration's initiatives in education and training research and development to a Learning Technology Symposium sponsored by the Environmental Protection Agency. The briefing sparked a great deal of discussion and concern about the support for this initiative across the federal agencies.

f. Assisted the SAET in preparing a major address to a national conference hosted by the Chicago City Schools organization. The conference was attended by national leaders in education and technology and the presentation given by the SAET was well received.

g. Organized and conducted a status briefing to Dr. Bellman from the support team (POGO) for the CAETI initial activities. Team members reported on their progress in providing technology tools for the quick start demonstrations at the two selected DoDDS school complexes this spring as well as the status of technology evaluation tools, assessment tools for learning productivity, and technology insertion plans for the schools. Also of concern was the status of school complex networks to allow access to the Internet and how best to do this in Germany. Several experiments are underway to use commercial providers, share copper wire networks with the military, and use the Defense Simulation Internet backbone for the selected schools. This effort will continue to be refined as well as equipment purchases for the teachers, as the initiative moves along the next few months.

3.6. March 1995

a. Assisted the SAET in organizing and managing the announcement by the Vice President of the Learning Challenge Grant program. This program will provide $27M in FY95 for applicant teams to build compelling software for use in K-12 schools. Application packets have been published and provided through the Interagency Technology Office for award of grants in the $1-3M dollar range this summer. This team has and will continue to assist the Interagency Technology Office in administering the Challenge Grant program but is forbidden from participating in the evaluation process. As of early April, several thousand grant requests or inquiries had been received A second round of Grants for FY96 has been requested in the President's budget at a sum of $50M. This is expected to continue for the next five years. As a follow on to this announcement, another announcement in early summer will lay out the larger Technology Learning Challenge that will include a number of initiatives with demonstration grants for FY96 chief among them.

b. Several meetings were organized and conducted for the Research and Development Subcommittee for Education and Training Technology in preparation for the grants

programs described above as well as preparation for the quarterly meeting of Committee on Education and Training. An additional task of this subcommittee will be assisting the DoED's requirement to build a national educational technology strategic plan. This requirement is spelled out in congressional language granting FY95 dollars for DoED technology programs.

c. Assisted the SAET in preparing information for his attendance at the quarterly meeting of the Committee on Education and Training. The meeting was well received and the SEAET motivated the other agencies to look for ways and means to support interagency technology demonstrations.

d. Prepared briefings and remarks for the SAET's formal presentation as a keynote speaker to the annual International Distance Learning Conference in Washington, D.C. The remarks were well received and a number of paper copies were shipped to conference participants.

e. Attended the NATO panel meeting on software in support of the CAETI PM. The CAETI PM gave a number of presentations and provided information on CAETI activities to a host of NATO members.

f. Coordinated with the Institute for Defense Analyses Simulation Center to determine the requirements for establishing a simulation demonstration area for education and training products germane to the CAETI effort. It was agreed to set-up the center and negotiations are on-going on how the center will be manned and what products are required to populate it. The center will be invaluable in providing a centralized means to show interested parties the various tools developed for CAETI and their applications in the school setting as well as in the DoD training setting.

g. Participated as the CAETI PM representative in several coordination meetings with Dr. Lila Cheville, the DoDDS interface to the CAETI program, to ensure smooth project operations as the DoDDS schools and the CAETI quick start effort begins to take shape.

3.7. April 1995

a. Assisted the SAET in preparing presentations that he made to several groups on the administration's goals and initiatives in education and training technology research and development. These groups included a meeting of the Global Village, a French delegation of educators, the annual convention of the Interactive Multimedia Association held in partnership with the National Association of Broadcasters, and to the corporate meeting of the Science Applications International Corporation.

b. Attended a meeting with the SAET and a senior Vice President of Hughes that is interested in understanding education and training technology and the potential for markets in this area. The SAET made a compelling case on where a corporation with their technical resources, particularly wireless video, could make an impact in this marketplace.

c. Attended several meetings with the SAET and various corporate representatives that were trying to better understand the impact of proposed legislation to reduce funding for

education and training. Support has also included a number of papers, meetings, preparation of presentations, and gathering of information to strengthen the SAET's overall understanding of the proposed recessions and budget reductions. Additional activities included possible strategies to make this a bi-partisan issue and maintain strong legislative support for continued federal funding for education and training research and development.

d. Participated with the SAET in a follow-on meeting with the American Council of Education to assist in formulating their vision and strategic goals for technology and distance education. Among the participants was the President of the International Correspondence Schools company that has over 300,000 students enrolled in correspondence studies. The majority of the students are pursing home studies in computer applications and the company provides them a computer as part of their course materials.

e. Presented a briefing to the Defense Systems Management College on the potential for distance learning and how their curriculum could be enhanced through the use of technology innovations. The college is looking for ways to get into this medium and provide services to their students without having them attend resident courses.

f. Represented the SAET as a member of a work group under the leadership of the Department of Education that is charged with preparing a national technology plan for education and training. The plan is in the draft stages of preparation with a July completion date. When completed, the plan will provide to the congress and the American public, the vision and role of the federal government in this critical area.

g. On behalf of the CAETI PM, attended a meeting with Mississippi State University to receive a briefing on their capabilities in developing multimedia courseware and to coordinate on their possible participation in supporting the Air Force reserves in applying CAETI tools to Air Force training.

h. Prepared a number of briefings for the CAETI PM that was presented to various audiences. The key presentation was a status briefing to Dr. Anita Jones, Deputy Director, Defense Research and Engineering. Other audiences included the University of Maryland and other DoD activities.

i. Represented the CAETI PM at a meeting with the Naval Medical Research and Development Command to explore the latest developments in telemedicine and to determine the role CAETI tools may play in this arena as well as any commonalties between program technologies.

4. Specific Topics

4.1. CAETI BAA

The team was a key provider of technical analysis and support for the draft Broad Agency Announcement being prepared by Dr. Kirstie Bellman, ARPA program manager for the Computer Aided Education and Training Initiative (CAETI). The BAA was made available to industry for their responses on 23 November 1994 time frame. Technical analysis and support for the draft Program Information Plan (PIP) was also prepared during this period to provide complementary details of the CAETI program that is spelled out only in general terms in the BAA. The PIP provides details on the BAA to industry and other agencies interested in pursuing possible CAETI program bids. After BAA release, approximately 75 responses were immediately received. This support team is not involved in the evaluation of these BAA responses nor was this team responsible for any aspect of establishing the BAA requirements or evaluation factors. Only administrative and staffing functions were performed.

The team provided other technical assistance on the elements of the initiative. Of particular interest were meetings with the technology teams interested in pursuing "quick start" demonstrations and with the Department of Defense Dependent Schools System (DoDDS) headquarters to begin integrating schedules and earmarking possible school systems for inclusion in the CAETI program. Met with the support contractors working the evaluation program again during this reporting period to further clarify the need to develop an overall evaluation strategy. Principal activities were the further development of criteria for school selection in Department of Defense Dependent Schools System (DoDDS) that will be earmarked for technology demonstrations, both for quick start (labeled "POGO") and the longer term CAETI program.

The team met with Dr. Steve Funk, NSF, to develop a coordinated approach between CAETI and the Broad Agency Announcement for DoDDS technical proposals that he is managing. The goal is to maximize test bed activities at DoDDS and to ensure the content material he is supervising in his program works in concert with the overall CAETI plan. Both are designed to introduce technology and compelling content into the DoDDS school system as demonstration projects.

The team conducted several planning meetings with a principle one on being on December 21. At this meeting, we presented a briefing that integrated the CAETI program with the National Science Foundation educational technology solicitations and asked for DoDDS to consider these programs as a single entity in their planning. This was enthusiastically accepted and we are now putting together an integrated program as part of the overall CAETI management plan. Coordination with DoDDS on target schools for conducting the technology insertion projects was also conducted at this and previous meetings. Currently, DoDDS has narrowed candidate schools down to four in Germany and two in Italy. From this list, they will do on-site surveys (with our assistance) and down select to two or possibly three for CAETI/NSF use. Our assistance

in helping them craft the selection criteria and process for narrowing down to the candidate list was greatly appreciated.

4.2. OSTP Support

The team participated with the Special Assistant for Education and Training (SAET) in a series of monthly meetings held for the Deputy for Technology in the Office of Science and Technology Policy (OSTP), White House Executive Office of the President. The meeting concentrated on the establishment of the FY96 R&D priorities with special emphasis on preparing the OSTP input to the National Science and Technology Council. Education and training technology continued to be one of the top R&D priority areas for OSTP from among the eight areas submitted. The rationale for $88 million in "new" money was recommended and briefed to the OMB budget examiners as essential for this area. The request received favorable support from OMB and when coupled with their additional funding support for approximately $100M in new funds for a Learning Challenge Grant, significant resources will be available beginning in FY96 to build upon an interagency R&D agenda that will make significant gains in the use of technology in education and training.

The team also provided support in setting an agenda and scheduling a meeting hosted by Paul Dimond, National Economic Council, and Dr. Henry Kelly, OSTP, to go over the status and next steps for the Technology Learning Challenge (Challenge Grant is a part of this). This was a key meeting and set the direction for all the federal interagency activities that will be pursued in education and training technology (R&D as well as deployment). The meeting was attended by the Office of Management Budget and they reported that funds had been made available in the FY1995 budget ($27M) and is in the FY1996 planned budget at approximately $80-100M for the Challenge Grant part of the Technology Learning Challenge. Funds for the other activities (R&D) while there, were in the DoED's budget lines and it is necessary for them to commit these funds to the ITO if the interagency team accomplishes what it has laid out in the strategic plan.

4.3. Symposia and Demonstrations

Team members attended with the SAET a technology for education and training symposium. The symposium included a panel discussion on the future benefits and current obstacles to the use of technology in education and training. The DoD representative on the panel was BGEN Campbell, USAF director of modeling and simulation, who spoke on the need for transferring the already developed technology tools into the civilian education and training environment.

Team members also attended the Industry/Interservice Training, Simulation, Education and conference with the SAET and observed numerous workshops, briefings, and demonstrations of leading edge modeling and simulation technology applications for education and training. The displays were particularly powerful and while the majority of them were military oriented, it was easy to see the vast potential this technology holds in store for the broader education and training world. The large turn out of vendors speaks well of the commercial market this technology now holds in store for the education and

training world. The demonstrated concept of real-time, interactive, distributed learning through simulations and networks was particularly intriguing. Also of interest was the emerging use of this technology to the world of entertainment and probably holds the greatest potential for a commercial market.

Team members attended a briefing and demonstration of the use of simulation for training by the Bechtel corporation. Bechtel, in cooperation with a consortium of other commercial vendors and in cooperation with the EPA, have developed a package to use simulation to support their training needs for expensive and unique training on large pieces of equipment. They are looking for funding support from various federal agencies for their concept.

The team attended the Supercomputing 94 Grand Exhibition in Washington, D.C. and surveyed the vendors for potential applications to education and training. While the next generation of hardware and software tools were impressively displayed, there was little in direct applications available for education and training to view. The University of Pennsylvania demonstrated an intelligent navigator system that allowed one to quickly find resource material from any digital source that was very impressive.